Grade 11 Essential Mathematics (30S)

Final Practice Exam

answers

Part A: Multiple Choice

Circle the letter of the best answer for each question.

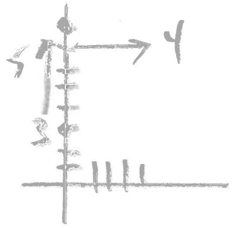
1. Select the account that would be appropriate for Janelle.

   Janelle has her first part-time job and needs to open a bank account for her money. At the moment, she is not concerned with setting any money aside for later. She just wants to have access to it for her usual spending.

   a) Savings account
   b) Chequing account
   c) Electronic savings account
   d) Combined chequing and savings account

2. Calculate the slope of a line if it goes up from 3 to 8 as you move 4 units to the right.

   a) $\frac{8}{3}$
   b) $\frac{1}{2}$
   c) $\frac{4}{5}$
   d) $\frac{5}{4}$



rise 5
run 4

$\frac{\text{rise}}{\text{run}}$

#4 already has answer!

4. Which of the following is not an example of a linear relation or pattern?

   a)

Age (years)	5	10	15	20	25
Weight (lbs.)	60	110	150	185	185

50 40 35 0

   This table is not a linear relation because the age increases by five years each time, but the weight does not always increase by the same amount each time.

   b)

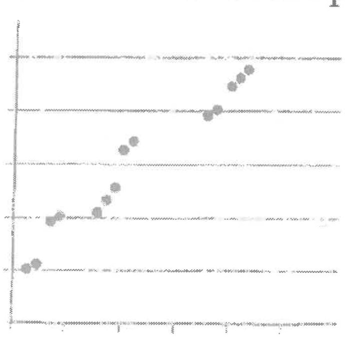
Sam's Age	2	4	6	8	10
Jay's Age	1	3	5	7	9

   This table is a linear relation because for every two years that Sam ages, Jay also ages two years.

   c) 2, 10, 18, 26, 34, 42…

   This sequence is a linear relation because it increases by 8, but it is not a relation—a relation must have two parts that are mathematically connected in some way.

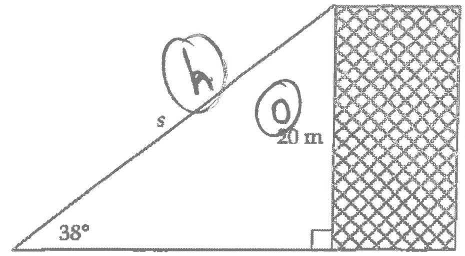
   d)



   Although it doesn't look completely linear, a line of best fit could be drawn that would pass through or near all points.

6. Select the trigonometric ratio you would use to solve for *s*.
   a) tangent ratio
   b) cosine ratio
   c) sine ratio
   d) Pythagorean theorem

$\frac{o}{h}$

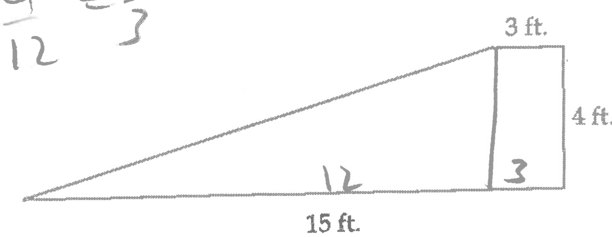


7. Identify a benefit of using your debit card to purchase goods.
   a) The interest charged for the money you spend is usually somewhat less than the rate charged by a credit card company.
   b) You are able to overdraw your bank account at any time as much as you want.
   c) If your card and PIN are stolen, you are reimbursed for the money taken by the thief.
   d) You can use it to purchase goods without using credit or adding to your debt.

8. It is important for you to keep your personal and financial information secure. Select the statement that is not a proper security precaution.
   a) Filter your email so that you can dispose of the junk mail without having to open every message.
   b) Share your password with people so that, if you forget it, they can tell you what it is.
   c) Use a combination of letters and numbers in your password.
   d) Do not share personal information on websites that are not marked as secure.

9. Calculate the slope of the ramp.
   a) $\frac{1}{3}$
   b) 3
   c) $\frac{4}{15}$
   d) $\frac{1}{5}$

$\frac{rise}{run}$ $\frac{4}{12} = \frac{1}{3}$



10. The slope of a horizontal line is:
    a) undefined
    b) 1
    c) 0
    d) -1

1. Draco invests $5000. Approximately how long will it take for the investment to double if the rate is 10% compounded annually?
   a) 8 years
   b) 7 years
   c) 720 years
   d) 7 months

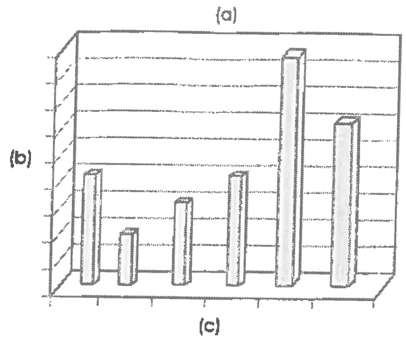
3. Which axis is the qualitative axis?

   a)

   b)

   c)

Quantitative — amount
qualitative — category



4. Which of the following is not a step in getting out of debt?

   a) Stop using your credit cards

   b) Consolidate your debts

   c) Do not tell anyone you are in debt

   d) Cash in some of your investments

5. How much is the volume of a rectangular prism changed when you double one dimension?

   a) The volume stays the same.

   b) The volume is multiplied by 4.

   c) The volume is doubled.

   d) The volume is multiplied by 8.

6. Which is the most cost-efficient way to pay for a big ticket item?

   a) buy now, pay later

   b) installment buying

   c) personal loan

   d) cash

7. The surface area of a sphere is 25 cm^2. Convert this to mm^2.

   a) 2.5 mm^2

   b) 2.5 mm^3

   c) 0.25 mm^2

   d) 2500 mm^2

8. Which type of credit should Danuwa use to pay for his university costs when he moves to Toronto to go to university?

   a) credit card

   b) overdraft protection

   c) personal line of credit

   d) consumer loan

9. Devdas invests $4600 for eight years. The investment earns 5% in simple interest. How much interest will Devdas earn on the investment?

   a) $1840
   b) $184 000
   c) $11 500
   d) $115

I = PRT
(4600)(0,05)(8)

10. The volume of a prism is 5184 in.³. What is the volume in cubic feet?

   a) 432 ft.³
   b) 36 ft.³
   c) 62 208 ft.³
   d) 3 ft.³

Part B: Definitions

Match each definition with the correct term from the list below. Write the correct term on the line below each definition. Terms are used only once. Not all terms have a definition provided.

angle of depression	cosine ratio	fixed value	recurring expenses
angle of elevation	deficit	geometric sequence	savings account
arithmetic sequence	dependent variable	independent variable	scale factor
budget	direct variation	interpolation	scatterplot
cheque register	electronic savings account	linear relation	service charge
chequing account	expenses	oblique projection	sine ratio
combination account	exploded view	one-point perspective	slope
component view	extrapolation	outstanding entry	tangent ratio
constant of variation		partial variation	unexpected expenses
			variable

3. This account is used for day-to-day banking, and usually requires a minimum balance to pay interest. Combination account

4. Estimating values outside the set of data. extrapolation

5. The ratio that compares the dependent and independent variables of a linear relation.
   Slope

6. Money paid to another person or company to pay for an item or service.
   expenses

7. A ratio that compares the sides opposite and adjacent to an angle in a right triangle.
   tangent ratio

8. An organized way to analyze and plan the way you save and spend money, and that allows you to set and achieve goals. budget

9. A symbol or letter that represents an unknown value. Variable

10. A variable in a math relationship that is not affected by the other variable.
   independent variable

bar graph	continuous	histogram	personal line of credit
buy now, pay later	credit	independent	prism
capacity	credit card	installment buying	pyramid
carrying charge	cylinder	installment price	referent
circle graph	dependent	interpolation	simple interest
composite	discrete	line graph	sphere
compound interest	extrapolation	low risk	surface area
cone	faces approach	net	volume
consumer loans	high risk	overdraft protection	

1. Data that can be sorted into well defined categories. discrete
   (Module 3, Lesson 1)
2. Purchasing by paying the taxes upfront but waiting to pay the cost of the item at a later time. buy-now, pay-later
3. Calculate surface area by adding the area of each surface. faces approach
4. Investment whose interest rate does not vary much. low risk
5. A 3-D object that has a polygon base and triangular sides that share a common vertex. pyramid
6. A graph that relates independent and dependent variables. line graph
7. Credit given as a large amount of money, and you are charged interest on the *entire* amount. consumer loans
8. In a relationship, the variable that is affected by the other. dependent

p.8 mid

9. A 3-D object that has two circular faces joined by a rectangular face that wraps around the circumference of the two circles. cylinder
10. Borrowing money with the promise to pay it back. Credit

Part C: Long Answer

Show all formulas and calculations used to answer each question. Write your final answers rounded to the number of decimal places indicated in the questions. Include units where appropriate. Clearly state your final answer.

p.9 mid

Module 1: Interest and Credit *(38 marks)*

1. Drazan takes out a short-term loan of $7300 from his financial institution. He repays the loan 21 days later. If he pays $49.35 in interest charges, calculate the rate of interest he is charged. Write your answer as a percentage rounded to the nearest whole number. *(3 marks)*

$I = 49.35 \quad r = ? \quad t = \frac{21 \text{ days}}{365} = 0.05733 \text{ years}$

$r = \frac{I}{Pt}$

$= \frac{49.35}{(7300)(0.05753)}$

$= \frac{49.35}{420} = 0.1175$

Interest rate around 12%

p.10 mid

2. Due South has $100,000 to invest for a period of five years. Institution A offers him an interest rate of 7% compounded semi-annually. Institution B offers him an interest rate of $6\frac{1}{2}$% compounded monthly.

P I

$R = 0.07$ $n = 2$

$R = 0.065$ $n = 12$

$A = P(1 + \frac{r}{n})^{nt}$

a) Using the compound interest formula, calculate which institution offers Due South a better return on his investment. *(5 marks)*

A) $r = 0.07$; $n = 2$

$A = 100\,000\left(1 + \frac{0.07}{2}\right)^{(2)(5)}$

$= 100\,000\,(1 + 0.035)^{10}$

$= 100\,000\,(1.035)^{10} = \$141\,059.88$

B) $r = 0.065$; $n = 12$

$A = 100\,000\left(1 + \frac{0.065}{12}\right)^{(12)(5)}$

$= 100\,000\,(1 + 0.005417)^{60}$

$= 100\,000\,(1.005417)^{60}$

$= \$138\,281.73$

A offers better return.

b) How much more interest could be earned by investing in the institution that offers a better return? *(1 mark)*

$141\,059.88 - 138\,281.73$

$= \$2778.15$ more could be earned with A.

↓3 c) Determine the difference between the actual value of the investment after eight years and the doubled value found with the rule of 72. *(1 mark)*

$24\,000 - 23\,910.75 = \$89.25$

p.11 mid

3. Demelza invests $12,000 for eight years. At the end of eight years, her investment is worth $24,000.

a) Use the rule of 72 to estimate the interest rate Demelza receives. *(1 mark)*

$\frac{rt}{t} = \frac{72}{t}$

$r = \frac{72}{t}$

$= \frac{72}{8} = 9\%$

b) Use the compound interest formula to determine the actual value of $12,000 compounded annually for eight years at the interest rate you found in part (a). *(2 marks)*

$A = P(1 + \frac{r}{n})^{nt}$

$= 12\,000\left(1 + \frac{0.09}{1}\right)^{(1)(8)}$

$= 12\,000\,(1 + 0.09)^8$

$= 12\,000\,(1.09)^8$

$= \$23\,910.75$

5. Doneshia needs a loan from the bank to pay for a car that costs $14 000. If Doneshia pays $450.10 per month toward the loan, what are the interest rate and term of the loan? *(2 marks)*

→ number of 1000 dollar units
$14 000 ÷ 1000 = 14

→ monthly payment per $1000
$450.10 ÷ 14 = $32.15 per month

→ amortization table → rate 9.75% (row)
→ term 3 years (column)

6. List the three questions you should ask yourself when deciding whether to save money by paying cash now, or whether to use a sales promotion (buy now, pay later, or installment buying) to buy an expensive item like a computer. *(3 marks)*

(1) Do you have enough money to pay cash now?

(2) Do you need item immediately?

(3) Can you save enough money to pay cash for it within 6 months?

7. On October 5th, DuHo uses a credit card to make a purchase for $163.16. The purchase appears on his monthly statement issued October 20th. DuHo doesn't pay for the purchase by the due date indicated on the October statement. His next monthly statement is issued November 20th. Calculate the interest he is charged for the purchase on his November statement. Assume his lending institution charges him an annual interest rate of 18.25%. Assume that he is charged interest from the date of purchase. *(4 marks)*

Oct 5 – Nov 20 = 47 days

$I = PRT$

$= (163.16)(0.1825)\left(\frac{47}{365}\right)$

$= \$3.83$

He will be charged $3.83 interest

8. The balance on Duong's credit card statement is $1435.86. The minimum payment on the statement is 5% of the statement total or $10, whichever is greater. How much will the minimum payment be on Duong's statement? *(2 marks)*

5% of $1435.86 = 71.793

minimum payment around $71.79

9. Daniela is buying a dining room set. The cash price of the dining room set is $2799 plus taxes. The installment terms are $100 down plus $90 per month for three years. The monthly payment includes taxes.

a) Calculate the cash selling price of the dining room set. *(2 marks)*

PST 2799 × 0.07 = $195.93

GST 2799 × 0.05 = $139.95

2799 + 195.93 + 139.95 = $3134.88

b) Calculate the installment price of the dining room set. *(3 marks)*

3 years = 36 months

90 × 36 = $3240 → total value of payments.

3240 + 100 = $3340

payments down

Installment price is $3340.

c) Calculate the percent rate of the finance charge compared to the cash selling price. *(2 marks)*

finance charge 3340 − 3134.88 = $205.12

percent rate $\frac{205.12}{3134.88} \times 100 = 6.54$

Percent rate is 6.5 %

1. Dakota is a member of the student council and is organizing the pizza lunch for all the council members. At the last meeting, the secretary surveyed everyone to find out what kind of pizza they like to eat. The following data was collected. 5 + 8 + 3 + 3 + 7 = 26

68° Pepperoni—5/26 = 19 % 0.19 × 360 = 68°

109° Cheese—8/26 = 31 % ← change to 30% so it will add up to 100% 0.30 × 360 = 108° ← round up to 109°

43° Hawaiian—3/26 = 12 % 0.12 × 360 = 43°

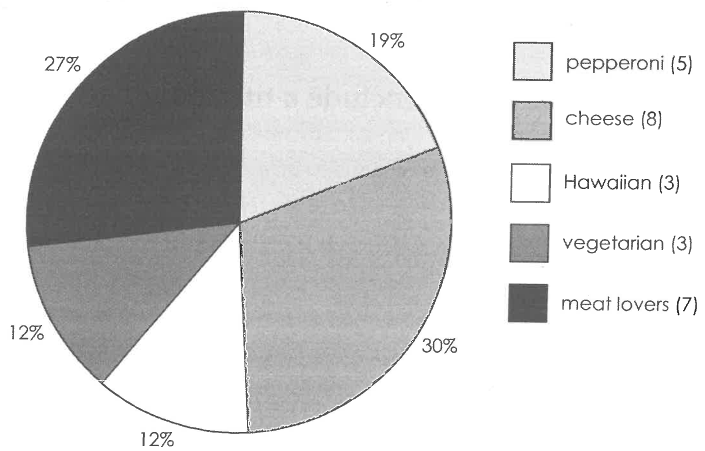
43° Vegetarian—3/26 = 12 % 0.12 × 360 = 43°

97° Meat Lovers—7/26 = 27 % 0.27 × 360 = 97°

101 % 359°

Draw a circle graph to represent the data. Be sure to include a title and all the

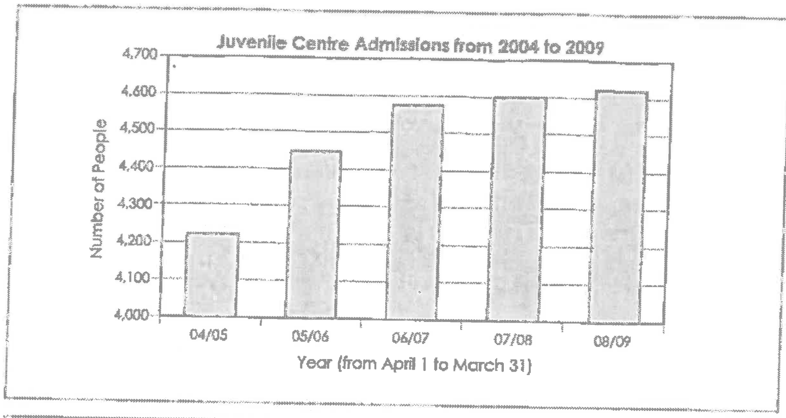
Preferred Pizzas of Student Council Members



(1 mark for title, 1 mark for legend, 1 mark for data in the legend, 1 mark for % labels, ½ mark for each angle – accurate to within 1 degree)

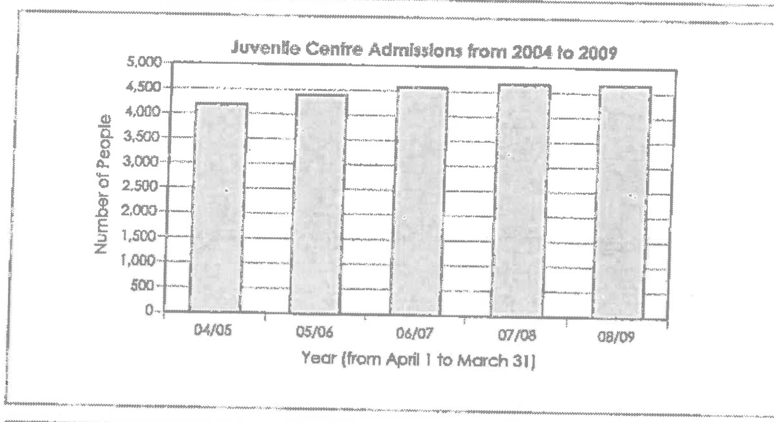
2. Use the Statistics Canada data depicted in the following graphs to answer the questions below.

Graph A:



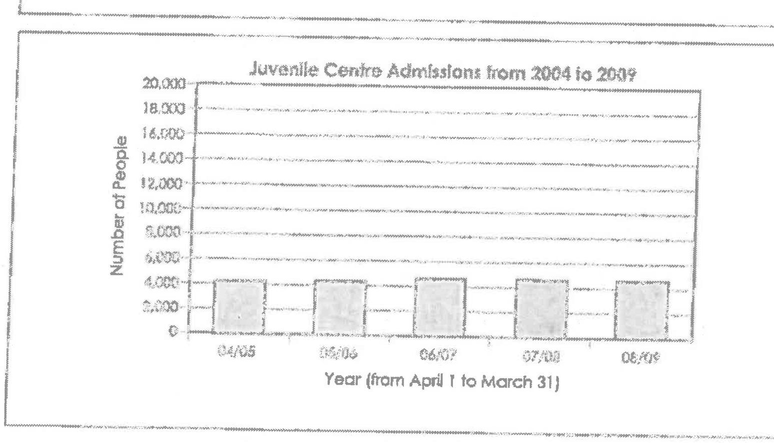
(A) Appearance would help support media's claim because it makes it seem like crime increasing a lot.

Graph B:



(B) It make number of admissions look high but does not appear to be greatly increasing. Not effective.

Graph C:



(C) Not effective. Bars too short (looks like there is little crime) and doesn't appear to increase much.

a) After a number of crimes are committed at local schools, the media is suggesting that harsher punishments are necessary to reduce the increasing amount of juvenile crime. Which graph would support this argument best? Explain why. *(2 marks)* (A)

(A) - Vertical scale small → change from one year to another appears quite large. Makes it seem as though youth crime is increasing by a lot each year. In fact, largest growth is only approx 200. $\frac{200}{4200}$ is less than 5%.

b) Which graph is the most "honest" graph because it does not present the data in a distorted way? *(1 mark)* B

1. Delanie is a single mother with two children, ages 6 and 10. Delanie ~~works~~ 35 hours per week as an information technologist. Her net annual income is $26,945. Delanie is now renting an apartment ~~but would like to own her own condominium.~~ She receives a monthly child tax benefit of $72.60 for her two children. Delanie's expenses for the month of September will include the following:

- rent of $550.00
- adult bus pass of $55.85
- bus tickets of $7.50 for each child
- taxis of $14.00
- telecommunications payment of $30.00
- hydro payment of $75.00
- groceries of $480.00
- clothing of $200.00
- eyeglass expense of $142.60
- school supplies of $60.00
- child-care expense of $180
- gymnastics lessons of $30
- personal care expense of $28.00
- entertainment expense of $40.00
- gifts of $30.00

$1930.45

Her annual expenses will include the following:

- life insurance premiums of $249.10 ÷ 12 = $20.76
- tenant insurance of $212 ÷ 12 = $17.67
- children's summer camp of $350 ÷ 12 = $29.17
- Christmas spending of $240 ÷ 12 = $20
- newspaper subscription of $170 ÷ 12 = $14.17

$101.77

monthly income
26 945 ÷ 12
= $2245.42
+ tax benefit 72.60
= $2318.02

expenses 1930.45 + 101.77
= $2032.22

b) Is Delanie's budget in a deficit position? *(1 mark)*

Income − Expenses = $285.80
no.
She has a surplus of $285.80

c) Delanie would like to save $25 000 to use as a down payment on a condo. Will she be able to save this amount in the near future? *(1 mark)*

25 000 ÷ 285.80 = 87 months = more than 7 years.

No. It would take more than 7 years and she isn't even purposefully saving every month for retirement, emergency, etc.

d) The cost of children's bus tickets increases to $10.00 while adult bus passes increase to $75 per month. Explain how these cost increases will affect Delanie's budget. For example, will she be in a deficit position? *(2 marks)*

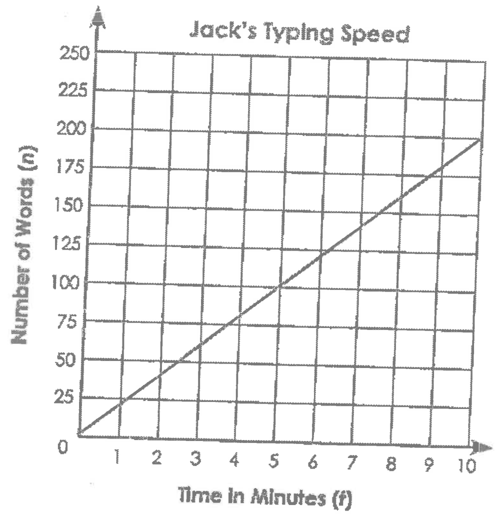
bus tix 10 − 7.50 = $2.50 more
bus passes 75 − 55.85 = $19.15 more

285.80 − 19.15 = $266.65. Still not in deficit.

2. List two advantages of online banking. (2 marks) - can check balances from anywhere in world

- paying bills online
- automatic transfers easy to set up, can automatically pay bills
- do not need to go to bank to transfer funds from one account to another
- 24 hours access to bank account
- online statements save paper

1. The graph below shows Jack's typing speed.



State the independent and dependent variables. (2 marks)

Independent variable: time (in minutes)

Dependent variable: number of words

2. a) How can you tell whether a set of numbers represents a linear pattern. Use an example as part of your answer. (2 marks) - if they increase or decrease by same number/amount each time.

ex. -20 -17 -14 -11 -8 ← increases by 3 each time

52 43 34 25 16 ← decreases by 9 each time (increases by -9 each time)

b) Does the table of values represent a linear relation? Explain your answer. (3 marks)

Number of Fish	3	6	15
Profit ($)	10	20	50

slope $= \dfrac{y_2 - y_1}{x_2 - x_1}$

or: $\dfrac{10}{3} = \dfrac{20}{6} = \dfrac{50}{15}$ proportions are equal.

slope of first 2 points: $\dfrac{20-10}{6-3} = \dfrac{10}{3}$

slope of 2nd 2 points: $\dfrac{50-10}{15-3} = \dfrac{40}{12} = \dfrac{10}{3}$

Yes because slope is the same for all points.

3. During the second week of November, Emma works the following hours: Monday, 2; Tuesday, 6; Wednesday, 3; Thursday, 8; Friday, 7. Emily's hourly rate is $15.

a) Express the relation between daily gross pay and hours worked with an equation. *(2 marks)*

g h

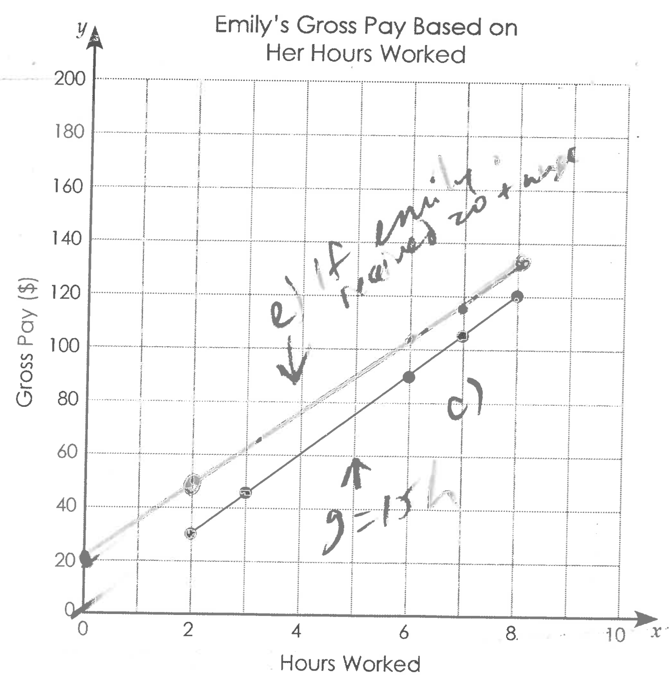
$g = 15h$

b) Complete the following table of values for the relation between daily gross pay and hours worked. *(3 marks)*

	Mon.	Tues.	Wed.	Thurs.	Fri.
Hours Worked	2	6	3	8	7
Gross Pay ($)	30	90	45	120	105

$g=15(2)$ $g=15(6)$ $g=15(3)$ $g=15(8)$ $g=15(7)$

c) Draw a graph to show the relation between gross pay and the number of hours worked. Write the appropriate scales and labels onto the graph. *(5 marks)*

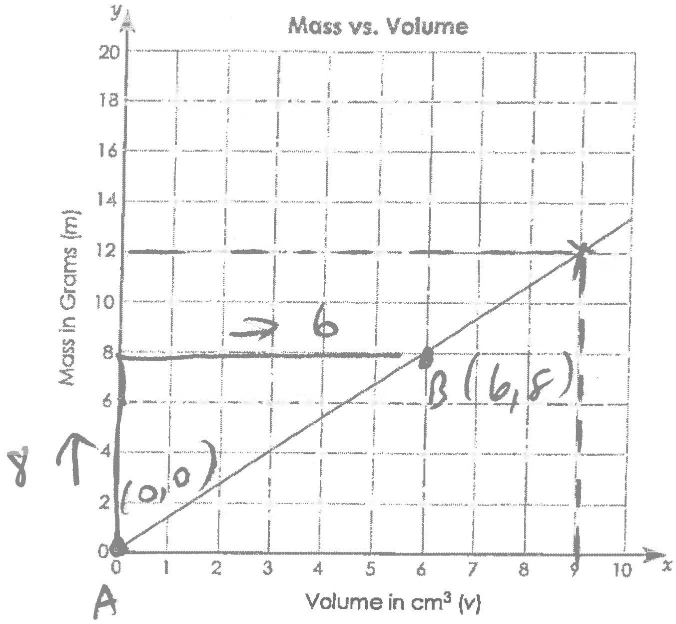


d) Explain how the hourly rate is related to the slope of the graph. For example, if she were paid only $10 per hour, how would this affect the graph? *(1 mark)*

The hourly rate determines how steep the line is. If she were paid only $10/hr., the line would be less steep. This is because the hourly wage is the slope of the graph.

e) If Emily were paid $20 per shift plus her wage of $15 per hour, how would this affect the graph? *(2 marks)* The graph would change from direct variation to partial variation. The line would start on y-axis at (0,20) instead of (0,0). The slope would be the same.

4. The relation between the mass (m) of a substance and its volume (V) is expressed by the following graph.



a) Choose two points on the graph and use the coordinates of these points to calculate the slope. *(2 marks)*

Slope = $\frac{\text{rise}}{\text{run}} = \frac{8}{6} = \frac{4}{3}$ or 1.33 g/cm³

or $\frac{y_2 - y_1}{x_2 - x_1} = \frac{8-0}{6-0}$

b) Express this relation as an equation. Be sure to identify the variables. *(2 marks)*

m represents mass   v represents volume

m = 1.33v

c) Find the volume of this substance with a mass of 18 g. Use the formula from part b. Write your answer rounded to one decimal place. *(2 marks)*

m = 1.33v

$\frac{18}{1.33} = \frac{1.33v}{1.33}$

13.5 = v

13.5 cm³

d) Find the mass of this substance with a volume of 9 cm³. Show your work on the graph. *(1 mark)*

On graph 12 g.

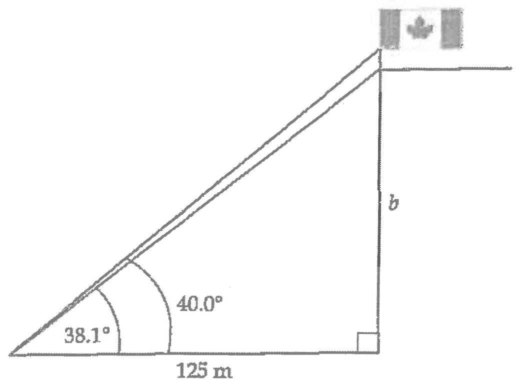
m = 1.33v

m = 1.33 (9)

m = 11.97 g

Interpolate

1. From a point 125 m from the foot of a building, the angles of elevation of the top and bottom of the flagpole are 40.0° and 38.1° respectively. The flagpole is set on the roof of the building.



a) Calculate the height of the building *(2 marks)*

$\tan\theta = \frac{o}{a}$

$\tan 38.1 = \frac{b}{125}$

$b = 125 \tan 38.1$

$b = 98.01\,m.$

b) Calculate the height of the flagpole. *(3 marks)*

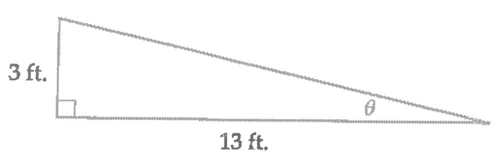
$\tan\theta = \frac{o}{a}$

$\tan 40 = \frac{h}{125}$

$h = 125 \tan 40$

$h = 104.89\,m$

2. Calculate the measure of θ in degrees. Write your answer rounded to one decimal place. *(2 marks)*



$\tan\theta = \frac{o}{a}$

$\tan\theta = \frac{3}{13}$

$\theta = \tan^{-1}\left(\frac{3}{13}\right)$

$\theta = 13°$